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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HO, ALLEN C

ART UNIT PAPER NUMBER

2882

DATE MAILED: 01/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/739,622

Applicant(s)

CASTENMILLER ET AL.

Examiner

Allen C. Ho

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 18-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-16 and 18-20 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 15.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "combiner" in claim 11 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 19 is objected to because of the following informalities:

Claim 19 recites the limitation "the three position detecting devices are arranged orthogonally with respect to each other". There is insufficient antecedent basis for this limitation in the claim. Furthermore, such an arrangement is not possible in a plane. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 6, 7, 10, and 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 5,243,195) in view of Kanaya *et al.* (U. S. Patent No. 5,995,22) and Ferraro *et al.* (1994).

Nishi disclosed a lithographic projection apparatus (Fig. 2) and a method of manufacturing a device comprising: a projection beam illumination system which supplies a projection beam of radiation (inherent); a first object table (**RST**) for holding a projection beam patterning device (**PA**) which patterns the projection beam according to a desired pattern; a second object table (**WST**) for holding a substrate (**W**); a projection system (**PL**) which images the patterned beam onto a target portion of the substrate; a reference frame (X, Y, Z); three position detection devices (**IFX**, **IFY1**, **IFY2**) comprising: collimated laser sources (in **IFX**, **IFY1**, **IFY2**); radiation detectors mounted in a fixed position on the reference frame (in the interferometers); mirroring devices (**IM_X**, **IM_Y**) mounted on one of the object tables that is moveable relative to the reference frame so as to reflect laser beam emitted by the laser sources toward the radiation detectors.

However, Nishi did not teach that the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector.

Kanaya *et al.* disclosed a position detection device that uses a two-dimensional CCD detector for measuring interference fringes.

Ferraro *et al.* taught that a two-dimensional CCD has the advantages of having low readout noise and high quantum efficiency and sensitivity in a wide wavelength range.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a two-dimensional CCD for light detection, since a person would

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be motivated to use a detector that has low noise and high sensitivity in order to measure the number of interference fringes precisely.

5. Claims 1-4, 6-8, 10, and 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Den Brink (U. S. Patent No. 5,801,832) in view of Kanaya *et al.* (U. S. Patent No. 5,995,222) and Ferraro *et al.* (1984).

Van Den Brink disclosed a lithographic projection apparatus (Fig. 1) and a method of manufacturing a device comprising: a projection beam illumination system which supplies a projection beam of radiation (**LA**); a first object table (inherent) for holding a projection beam patterning device (**MA**) which patterns the projection beam according to a desired pattern; a second object table (**WC**) for holding a substrate (**W**); a projection system (**PL**) which images the patterned beam onto a target portion of the substrate; a reference frame (inherent); three position detection devices (**73, 74, 75**) comprising: collimated laser source (**70**); radiation detectors (**76, 77, 78**) mounted in a fixed position on the reference frame; mirroring devices (**R₁, R₂**) such as trapezoid retro-reflectors (**106, 107**) mounted on one of the object tables that is moveable relative to the reference frame so as to reflect laser beam emitted by the laser sources toward the radiation detectors.

However, Van Den Brink did not teach that the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector.

Kanaya *et al.* disclosed a position detection device that uses a two-dimensional CCD detector for measuring interference fringes.

Ferraro *et al.* taught that a CCD has the advantages of having low readout noise and high quantum efficiency and sensitivity in a wide wavelength range.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a two-dimensional CCD for light detection, since a person would be motivated to use a detector that has low noise and high sensitivity in order to measure the number of interference fringes precisely.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Den Brink (U. S. Patent No. 5,801,832) and Ferraro *et al.* (1994) as applied to claim 1 above, and further in view of Gallagher (U. S. Patent No. 5,811,816).

Nishi disclosed a lithographic projection apparatus (Fig. 2) comprising laser sources.

However, Nishi did not teach that the laser source is mounted away from the reference frame, beam directing optics mounted on the reference frame, and an optical fiber to couple the laser source to the beam directing optics.

Gallagher *et al.* disclosed an interferometer comprising a laser diode (105) coupled to an optical fiber (102).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to introduce a laser beam using an optical fiber, since there are situations in which a person would be motivated to introduce a laser beam into a confined area where a laser diode would not fit.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Den Brink (U. S. Patent No. 5,801,832) and Ferraro *et al.* (1994) as applied to claim 1 above.

Van Den Brink disclosed a lithographic projection apparatus (Fig. 1) comprising a retro-reflector.

However, Van Den Brink did not teach that the retro-reflector is one of a trapezoid retro-reflector and a retro-reflector comprising a convergent lens and a reflective surface.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to choose from among the known equivalents based solely on design choice absent any showing of criticality; the lack of criticality is demonstrated by applicant's claiming of a plurality of equivalent devices.

8. Claims 1-3, 6, 7, 10, 12-16, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 6,331,885 B1) in view of Kanaya *et al.* (U. S. Patent No. 5,995,222) and Ferraro *et al.* (1994).

Nishi disclosed a lithographic projection apparatus comprising: a projection beam illumination system (11) which supplies a projection beam of radiation; a first object table (RST) for holding a projection beam patterning device (R) which patterns the projection beam according to a desired pattern; a second object table (TB) for holding a substrate (W); a projection system (PL) which images the patterned beam onto a target portion of the substrate; a reference frame (X, Y, Z); and a position detection system including three detection devices, each position detection device (76Y, 76X1, 76X2) comprising: a radiation source mounted on the reference frame; a radiation detector (inherent) mounted in a fixed position on the reference frame, wherein the radiation source and the radiation detector are adjacent to one another (76); and a mirroring device (60a, 60b, 60c) mounted on one of the object tables that is moveable relative to the reference frame so as to reflect radiation emitted by the radiation source toward the radiation detector, wherein the three position detecting devices are arranged non-parallel to each other.

However, Nishi did not teach that the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector.

Kanaya *et al.* disclosed a position detection device that uses a two-dimensional CCD detector for measuring interference fringes.

Ferraro *et al.* taught that a two-dimensional CCD has the advantages of having low readout noise and high quantum efficiency and sensitivity in a wide wavelength range.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a two-dimensional CCD for light detection, since a person would be motivated to use a detector that has low noise and high sensitivity in order to measure the number of interference fringes precisely.

Allowable Subject Matter

9. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

The allowable subject matter in claim 11 refers to an incremental position sensing device to detect a position of the moveable object table in a detection range wider than that of the position detection device and a combiner which combines output signals from the incremental position sensing device and the position detector to determine an absolute position of the object table in the detection range.

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

11. Applicant's arguments filed 18 November 2002 have been fully considered but they are not persuasive.

The applicant argues that Nishi and Van Den Brink fail to teach a position detection device. The examiner respectfully disagrees for the following reasons:

(1) An apparatus claim must be shown to contain features that are structurally distinguishable from the teachings of the prior art to be patentable. The recitation "position detection device" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Nishi and Van Den Brink in combination with Ferraro *et al.* disclosed all the structural elements in the "position detection device".

(2) Nishi clearly disclosed a position detection device that measures the position of the wafer table. It is true that the interferometers determine only change in the position of the

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wafer table (WST); however, the position of the wafer table relative to the home position (the zero reference) is determined when the changes (DX, DY) in the X and Y coordinates are provided to the main control system, which controls the motors (221, 222) to position the wafer table (column 41, lines 53-44). In other words, the changes in the X and Y coordinates (DX, DY) relative to the home position (0, 0) become the new coordinates of the wafer table.

(3) Van Den Brink similarly disclosed a position detection device that measures the position of the wafer table (column 12, lines 46-64).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (703) 308-6189. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached at (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Allen C. Ho
Examiner
Art Unit 2882

ACH
January 13, 2003


ROBERT H. KIM
SUPERVISOR
TECHNOLOGY CENTER